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## Control and Elimination of Thistles

Cooperative Extension

*South Dakota State University*

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*Cooperative Extension Service*

Control and Elimination of

# Russian Knapweed

## Russian Knapweed

**R**USSIAN KNAPWEED<sup>1</sup> is a perennial weed that spreads by seeds and underground parts. Although you will seldom find patches over 25 acres in size and the weed covers less than 1,000 acres in South Dakota, it is a serious weed.

Russian knapweed will invade native grass sods. Patches will spread in alfalfa fields and will spread more rapidly in cultivated fields. Once established, it will kill out all other crops. It is more difficult to eliminate than any of the other noxious weeds.

The seeds are small, rather flat, and gray. They are very difficult to remove from alfalfa or sweet clover seed. Many infestations have been established by planting these small-seeded legumes containing Russian knapweed seed.

One seedling, when not competing with other plants, is able to produce in one season a root system that penetrates 2 feet deep and spreads 2 feet in each direction. In two growing seasons the roots may go down 10 feet and spread out to form a circle 10 to 12 feet in diameter. The heavy dark brown or black vertical roots send out horizontal roots that give rise to new plants.

Russian knapweed develops earlier in the spring than any of the other noxious weeds except hoary cress and leafy spurge. It normally emerges early in May and is full grown (1 to 3 feet tall) in June. The stems and leaves are covered with a short gray knap and have a very distinctive bitter taste. The lavender rose or white flowers appear during late June. They are similar to small thistle flowers and are  $\frac{3}{8}$  to  $\frac{1}{2}$  inch in diameter. They do not always produce seed. The early, rapid, dense, rank growth gives the weed a great competitive advantage over spring-sown crops and all low growing crops.

### INTENSIVE CULTIVATION

Cultivation from immediately after small grain harvest until freeze-up (Oct. 15) followed with a full year of intensive cultivation (May 15 to Oct. 15 the next year) will kill most of the weeds. Sometimes there will be stragglers to clean up the next year. In other cases a single year of cultivation will kill 85 to 90% of the weeds.

A duckfoot field cultivator is one of the few implements that will cut the heavy tough roots of Russian knapweed. If there is considerable plant residue on the area, use the moldboard plow. Equip the cultivator with wide sweeps (12 to 24 inches) that overlap 3 or 4 inches. Keep them sharp; be sure they are flat when in the soil and operating at a depth of 4 to 5 inches.

It takes 7 to 10 days for new shoots to emerge after the roots have been cut. Another 7 to 10 days elapse before there are enough leaves to produce more food than is needed for growth. Therefore, little plant food is stored in the roots and root reserves are being used for 14 to 20 days after each cultivation.

Cultivate every 2 weeks during good growing conditions and every 3 weeks during dry, hot weather when plants are growing less rapidly. This generally means that cultivation should be done at 2-week intervals during May, June, and July and at 3-week intervals during August, September, and October.

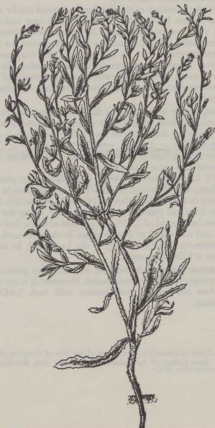
<sup>1</sup>*Centaurea repens* L.

By Lyle A. Derscheid, Experiment Station Agronomist, and  
Keith E. Wallace, Extension Weed Specialist  
(Experiment Station Project 32-R)

### SPRAYING

For Russian knapweed, 2,4-D is equal to or superior to MCPA, 2,4,5-T, 2,4-DB, and other related chemicals. Use an ester form of 2,4-D because the amine forms are not readily absorbed by the weed.

Use one-third to one-half pound of 2,4-D acid per acre to kill seedlings. Use 1 pound to prevent seed production and to keep the weed from spreading. Use a minimum of 1½ pounds



per acre when trying to reduce the stand. Repeated treatments with 2,4-D seldom kill more than half of the weeds even though they are continued for several years.

TBA (2,3,6-trichlorobenzoic acid) is effective for eliminating Russian knapweed. One application of 20 pounds of 2,3,6-TBA acid equivalent per acre will generally give 90 to 100% elimination. Two brands—"Benzac 1281" and "Trysben 200"—are available. Use 10 gallons per acre as each contains 2 pounds of 2,3,6-TBA acid per gallon.

PBA (polychlorobenzoic acid) is sold under the brand names of "Zobar" and "Benzac 354." Each contains 4 pounds of PBA acid per gallon. Use 40 pounds (10 gallons) per acre to get 80 to 100% elimination.

Both TBA and PBA are nonselective. They will kill any crop and the residual effect prevents or reduces crop production 1 or more years after application.

### CULTIVATION, CROPS, CHEMICALS

Several combinations of cultivation, crop, and 2,4-D will eliminate 90% of the Russian knapweed. However, the remaining 10% are difficult to kill.

**Small grain.** Russian knapweed starts early in the spring and gets ahead of spring-seeded grain. Use 1 pound of 2,4-D ester per acre to check weed growth so the grain can get ahead of the weeds. (This treatment applied to Mo-0-205 or Garry oats in the 5-leaf stage of growth did not injure the crop in several experiments and probably will not injure wheat or barley at the same stage.) Spray with 1½ pounds after harvest to prevent late seed production and to reduce the stand somewhat. This system controls the weed, but seldom reduces the original stand more than 50%.

A high percentage of the Russian knapweed can be killed in 3 to 5 years by spraying the small grain crop and cultivating after harvest each year. Use a duckfoot cultivator 3 or 4 times after harvest. In areas where soil erosion is a problem, winter grains have an advantage in that they provide cover over winter. Spray them about May 20 before the boot begins to swell. They emerge earlier in the spring and offer more competition, but do not allow for as many after-harvest cultivations.

**Corn.** If corn is raised any of the 3 to 5 years, spray during June and use drop nozzles for a second treatment after tasseling, using the same rates as for small grain. There is some danger of injuring the corn with the June treatment. Cultivate the crop at least four or five times—two or three times lengthwise and twice crosswise.

TBA kills Russian knapweed if applied before planting corn. Spray with 5 pounds of 2,3,6-TBA acid per acre as soon as the weeds are 6 to 12 inches tall (about May 15 to 20). Plow 10 days later and plant an early corn hybrid. Spray the corn with one-half pound of 2,4-D ester per acre after the first cultivation and cultivate 2 or 3 more times. In three research tests this treatment killed over 95% of the knapweed. In one of the tests, it killed the corn.

**Summer Crops.** A close-drilled crop of sudan grass is the most strongly competitive crop tested. However, it is not effective when not used in combination with both 2,4-D and cultivation.

Spray during late summer (August) with 1½ pounds of 2,4-D ester per acre. Cultivate three times the next spring (May 15, June 1 and June 15). Seed 25 pounds of sudan grass with a grain drill. Harvest the hay early in September. Plow after harvest and cultivate until freezeup.

This is the only combination of 2,4-D, crop, and cultivation tested that consistently reduced the stand of knapweed more than 90%. It was ineffective if any of the spraying or cultivations were omitted. Forage sorghum handled in the same manner should be equally effective.

**Forage Crops.** Alfalfa is not a good competitive crop for controlling Russian knapweed. The weed emerges before or at the same time that the alfalfa starts spring growth, and the knapweed produces a rank growth which stays ahead of the crop.

Brome grass and crested wheatgrass in combination with cultivation and spraying are effective crops. Cultivate with a duckfoot cultivator every 2 weeks between May 15 and August 15. Seed either grass at the rate of 12 pounds per acre. The next year spray twice (late May and late August) with 1½ pounds of 2,4-D ester per acre. This treatment will reduce the stand 85 to 90%. Spraying the next year may or may not reduce the stand further.

### GRAZING

Although Russian knapweed has a bitter taste, sheep will graze it when forced to it. Intensive overgrazing will materially reduce the stand.

### SOIL STERILANTS

Numerous soil sterilants can be used to eliminate patches (weed nurseries) of Russian knapweed in one treatment. Most of the chemicals are more effective when applied between September 1 and December 1; however, good results are often obtained from summer application. Apply the chemical to a band 6 or 8 feet wide around the outside of the patch to kill roots that extend beyond the patch.

The following chemicals generally give 95 to 100% elimination when applied at the rates designated below for each square rod. Use the higher rates for summer application.

Brand Name	Rate per Square Rod	Cost*
Ammate "X" .....	5 to 7 pounds	\$1.75
Atalacide .....	6 to 8 pounds	1.08
Chlorax .....	10 to 12 pounds	3.20
Chlorea .....	6 to 8 pounds	1.90
Concentrated Borasac .....	15 pounds	1.05
DB Granular .....	5 to 7 pounds	0.95
Novon Concentrate .....	½ to 1 quart	0.76
Polybor-chlorate .....	10 to 12 pounds	1.75
Sodium chlorate .....	5 pounds	0.90
TBA .....	½ pint	0.63

\*Approximate retail cost of chemical for 1 square rod at lower rate for areas 10 to 15 square rods in size. Cost increases for large areas and varies somewhat with local situations.